The narrative and the algorithm: Genres of credit reporting from the nineteenth century to today

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Information, Trust and Transparency

Recently a couple seeking a mortgage was given a strange task. Write out a "motivational letter," their lender asked them, an essay explaining their desire for a loan. They were to tell why they wanted the house, if they planned to have children, why they were moving, and other details that probed into their personal lives. Although they had excellent credit, high FICO scores, and little existing debt, the lender nonetheless wanted more. What was sought, it seemed, could only be provided in a narrative.[1]

We are used to thinking of credit reporting in its modern, quantitative form, but the genre of communication about credit in the nineteenth century was largely a narrative one. Through close assessment of a person's character, as revealed in their life story, merchants and lenders established a sense of the risks they undertook when extending credit. The usual assumption in history is that these somewhat quaint assessments gave way to a "harder," more quantitative form as the sources of numerical data increased, and the machinery to process it improved. Yet the recent credit crisis has called into question the security, objectivity and certainty of modern credit (and other debt) reporting. Reversion to a narrative mode, it would seem, is what happens when lenders no longer have faith in abstract systems.

I would like to suggest that we take this moment of crisis to look more deeply into the black box of algorithms and regressions that constitute the contemporary means of assessing risk. We can do this by looking back into the history and evolution of credit reporting. In most accounts, the history of credit reporting is something like this: better information leads to greater transparency, producing trust between parties to an exchange.

Trust arises as transparency eliminates information asymmetries that otherwise would permit strategic behavior, guile, and deceptive practices and misrepresentations. With better information, lenders more easily assess borrowers, establishing the risks of default or fraud, and price credit accordingly. Indeed, with true transparency, borrowers also have a clear view on lenders, allowing them to strike the best bargain. Because all see all, competing lenders will seek out the good credit risks, offering favorable terms, driving down borrowing costs and interest rates. Poor credit risks are segregated out, but they still win. Rather than "rationing" credit, that is, simply denying it to poor risks, lenders are able to reckon the risk of loss correctly, and so offer credit to bad risks at an appropriately higher rate of interest. [2] This then is a Pauline story—before creditors and debtors saw each other as through a glass darkly; now, they see face to face.

Embedded in this story are multiple undefined concepts and strong assumptions, most notably about information itself. Information is taken to be a homogenous resource, available for expropriation. The act of gathering, processing and making information useful may be difficult and costly, but it is essentially no different than what is required for any input. I would like to start from a different point: Information is not given by nature; it does not stand outside of people and their institutions, exerting a disciplining force on their behavior. Rather, it is created through the interactions of actors. Many implications might follow from this assertion, but the one I will emphasize is the irreducibility of strategizing. If humans can strategize, withhold, misrepresent, and seek information advantages when exchanging goods or capital, they can also do these same things when exchanging information. They can strategize about the very information that, putatively, is leading us to greater clarity and transparency.

In place of a progressive narrative of science and objectivity, I offer a less deterministic tale, one that follows not the arc of continual improvement in knowledge and technique, but navigates a fog of competing interests, contending values, ambiguous legal rulings, and varying institutions. Instead of smooth progress, one finds stasis, periodic crises, new starts, temporarily patched solutions, all produced and maintained through strenuous, but largely unseen labor. If credit assessment "works" it does so only in moments of carefully wrought stability, resting upon conventions as to what constitutes valid information. The conventions may be quite durable, though when they break down seemingly clear information turns opaque once more, or worse deceptive. It losses the ability to convey meaning, in the same way that counterfeit money calls into question a monetary system. During moments of epistemological crisis, actors will often turn to new (or old) ways of establishing meaning.[3]

Credit and Credit Reporting

Credit has been used throughout history, and wherever there has been credit, so too there has been some way to assess credit worthiness.[4] In many cases, assessment methods were the same or similar whether the credit was used to finance long distance trade, purchase real property or lubricate the wheel of consumption. It is tempting to assume that today all forms of credit assessment are converging into one highly rational model using behavioral predictors to construct statistically valid inferences to measure default and other risks. But a closer look at the past reveals striking differences in types of credit assessment for types of credit, differences that have persisted into the present. Even where there has been convergence, the history of credit reporting show distinctive paths of development in

different credit markets that cannot be explained as simply the gradual diffusion of technique. Following these paths of development allows us to open up the black boxes of method and technique, to see how and why credit assessment operates the way it does, and also why it can at times become unhinged.

What makes credit reporting work is a heterogeneous technology, an assemblage of machines, methods, forms of knowledge, embedded past practices and institutions that include law, politics and cultural values. Change can be slow and partial in this system, or it can come quickly when new institutions or knowledge artifacts are added to the assemblage. Among the actors involved in construction the credit reporting assemblage, motivations and interests vary greatly. One the one hand, all parties have a certain interest in sharing information. Creditors can focus a more exacting beam of inquiry on borrowers by uncovering aspects of their behavior hidden in the records and ledgers of other lenders. Yet for just this reason, creditors also have disincentives to share information. If creditors pool data, they open themselves up to competition. Each creditor reveals who among his family of borrowers is the best credit risk, an opportunity for others to go poaching with more attractive terms and interest rates. The result could be a frenzy of competition, lowering creditor profits.[5]

To the borrower, having more lenders compete for business should make credit cheaper. On the other hand, a wily borrower has incentive to keep information about himself separate from lender to lender—to represent himself in the best possible light in each case when he is seeking credit. This does not imply fraud (though it might) but simply an effort by the borrower to gain advantage by controlling representation, that is, the construction and release of information. Bad risks have reason to hide in the crowd of

good risks, for once the bad risk is exposed, he will pay a higher cost of credit. Although in theory good risk borrowers might shun and push out the bad risks, such behavior requires mechanisms of communication and coordination not usually available to individual borrowers. Moreover, for any individual there is a degree of uncertainty as to whether they will be accounted a good or bad risk. Such uncertainty works against voluntarily giving up more information than absolutely necessary.[6]

The calculus of information sharing plays out in different ways among different classes of borrower and lenders. Business borrowers, for example, may be highly dependent on trade credit to stay in business. Yet they may also strongly resist intrusive credit reporting. They fear the loss of the credit, and they foresee danger in revealing their methods of operation to competitors. Consumers too might resist the potential disciplinary effects of credit reporting, but changes in "lifestyle" can be easier to effect than changes in business practice that reflect unique competitive skills and strategic position. In short, there is reason to suspect (and historical evidence to show) that the sort of seamless, continuous, easily quantifiable shared information that modern credit scoring uses is extremely difficult to achieve. Institutional context plays a substantial role in determining what information is revealed, if, when and where it is shared, and what resulting credit reporting and scoring apparatus develops.

We can see this process at work by comparing the different ways in which trade and consumer credit evolved in the United States. Trade credit reporting was and has remained much less systematized and quantified than consumer credit reporting. The trade credit market relies less on shared information and more on narrative reporting. While consumer credit reporting began in the early twentieth century with similar

features, it moved in a much different direction, particularly after World War II. Trade associations, banks, and credit card systems developed an effective information sharing network that pushed consumer credit reporting into quantitative scoring. Below I discuss these different histories, and explore what they tell us about the process of creating, circulating and stabilizing information into a form suitable for decision making.

Trade Credit and R. G. Dun

In America, trade credit reporting has since the nineteenth century been performed largely through specialized intermediaries, notably R. D. Dun (Dun & Bradstreet) and a small number of competitors. Today the field is almost completely dominated by Dun & Bradstreet, except where organizations that began in the consumer credit market have begun to move into business credit reporting as well.

From its origins in 1841 through roughly the 1890s, Dun relied almost exclusively on local attorneys to scout up information on local retailers, storekeepers and merchants, which information was then sent, in written reports, to the New York headquarters. There it was entered into huge ledger books that Dun clients (lenders) could view. The original purpose of this system was to give New York wholesalers information on local retailers to whom they shipped goods on book credit payable at 30, 60, or 90 days. But information did not stay in New York.[7] Over time, as wholesaling moved out of the eastern cities, Dun opened offices in the interior. Information thus circulated both from the hinterland to New York, from New York to regional offices, within the territory of the regional offices, and, eventually between the regional offices as well.

The Dun system (and those of its competitors) depended on a carefully constructed, but unstable confluence of interests. Local lawyers agreed to serve as information agents not for pay, but in the expectation that when a debtor failed, they would be retained to collect the debt. This was a potentially lucrative business. Dun's clients, the New York wholesalers, had interest in obtaining as much information on potential borrowers as possible, but they did not have incentive to share what they knew about their own customers with Dun or with each other. No wholesaler wanted to encourage competition by revealing who his best customers in New Orleans or Cincinnati were. Dun, meanwhile, had every incentive to collect information—as much as possible on as many businesses as possible—to make the size of its information network a selling point.

Information networks frequently face the classic "chicken and egg" or network externality problem.[8] Buyers of information (the New York wholesalers in this case) will only subscribe to an information network if coverage is sufficient to make it useful. Sellers of information (Dun in this case) can only afford to collect information if there is a clear market for selling it. The local attorneys resolved this problem because they could collect the needed information with little or no upfront cost to Dun. Yet this structure also made it imperative that Dun control the information flow to exclude non-subscribers. If information were freely available, then Dun would never profit from its investment in collecting and processing. Finally, the objects of surveillance, the retailers, had mixed motives. They needed to be seen to obtain credit, but they resisted too much or the wrong sort (in their view) of surveillance that might result in cutting off the lifeblood of credit. The retailer/borrowers thus had strong incentive to shape how they appeared in the Dun reports and ledgers.

Aligning diverse interests was crucial to keeping the system in operation, and points of conflict were numerous throughout the nineteenth century. Retail merchants, for example, continually questioned the competence and honesty of the reporting attorneys, as well as the security and objectivity of the collected reports. After all, given the payment system, attorneys would benefit if a business failed, since they would be given charge of collections.[9] Attack on "secret surveillance" and the uncontested power of Dun's information network continued from start of credit reporting to the end of the nineteenth century, and beyond.[10] Legal cases went back and forth through the nineteenth century. Courts sometimes blessed credit reporting as a valuable commercial service. Other times they condemned it as detrimental to those it surveyed, and unreliable to those it served.

It was not clear to credit reporting firms how to respond to these conflicting messages. On the one hand, critics were charging that the firms were remote, imperious entities with little understanding of the facts on the ground, running information systems of questionable accuracy. On the other hand, they rebuked the "spying system" for being too personal and intimate when it pried into the "associations, the business, the family, and the personal habits of every man engaged in trade."[11] Generally, the credit reporters countered these charges by emphasizing thoroughness and comprehensiveness—no merchant was given a free pass, none were ignored or placed outside the system, and all were given a close reading by those best positioned to understand local conditions.

Creditors looked upon credit reporting with conflicting feelings as well. Small wholesalers, for example, often feared that the largest Dun clients got the best information first. This was a great concern when it came to bankruptcy and failure. The vagaries of American bankruptcy law meant that the first unsecured creditor on the scene had the best

chance of being repaid. Given the lack of certainty about order of payment, borrowers could also exploit creditors, paying their largest creditors first, while keeping the smaller ones dangling for as long as possible.[12] These conditions in turn made creditors unwilling to rely on the local attorneys for collection work, trusting their own lawyers to better represent their interests. But without payment in the form of collections, local attorneys had little incentive to do credit reporting.

Finally, credit reporting firms had to worry about the legitimacy of the entire enterprise, and the potential losses from leakage of information. To secure legitimacy—in the eyes of borrower, lenders and the courts—R. G. Dun placed great stress on the intimate knowledge of its attorneys on the scene, an argument that both aimed to persuade its clients that it had command of the facts, while convincing local retailers that what was sent to New York was thorough and complete. "The local agent," explained R. G. Dun founder Lewis Tappan, "…having his eye on every trader of importance in his country, and noting down as it occurs, every circumstance affecting his credit…becomes better acquainted with his actual condition than any stranger can be."[13] "As near as possible to personal acquaintance…" wrote Hunt's Merchant's Magazine.[14] Credit reporting was merely doing in systematic fashion the same thing "as merchants usually employ—only on an extended plan—to ascertain whether persons applying for credit are worthy of the same and to what extent."[15] Rather than depersonalizing credit information, Dun and other agencies repersonalized it, seeking to stabilize the credit market by attending closely to the intimate details of the business, and the businessman (or woman).[16]

The quest for legal legitimacy and the dangers of information leakage shaped Dun's approach to collating and conveying information as well. The massive ledgers in New York

only yielded their secrets to clients who presented a valid ticket at the office.[17] Clerks then read the information contained within, allowing the interested merchant to take notes, unless the information was considered too inflammatory. To save time most clients sent their own "confidential clerk" to receive the information, a procedure that was shaped by American libel law. Throughout the nineteenth century, Dun and other credit reporting firms lived under threat of libel or slander suits, shielded only by the common law doctrine of privileged communication. The law of privilege protected credit reporting as a legitimate and necessary exchange of business intelligence, but only if the information was conveyed to interested parties (the creditors), and not widely dispersed. It was generally safe only to have the principal of a mercantile establishment or an employee designated as his confidential clerk hear the report. The result was the cumbersome in-person reading, though in this case legal necessity dovetailed nicely with the credit agency's desire to prevent non-subscribers access to its books.

These procedures clearly worked against efficient circulation of information, and hence against transparency.[18] If information wants to be free, it found little liberty in this system. What the system did provide, however, was a powerful mechanism for establishing meanings, and hence the conventions of judgment and decision making.

At the simplest level Dun merely wrote down, organized and read out what its local agents had found—just the "facts." Facts were a good defense against charges of prejudice, incompetence or libel. Much turned on the completeness of the reports, as well as the repetition of collecting over time, showing freshness of data. Collecting lots of data, in diverse form, continually, made a case for the virtues of credit reporting to both clients and subjects. And it also placated the courts. The larger the percentage of the business

community covered by reporting, then the more likely a court would see it as a standard, useful business practice.[19] But what was a fact, and where did the collecting end? As the ledgers of R. G. Dun filled up, as new reports layered on top of older ones, rich detail threatened to become a messy collection of discreet bits of data and bare facts open to any interpretation. Given the constraints imposed by the structure of interests and the law, credit reporting evolved a narrative form to deal with this issue.

Narrative is a way of giving shape and meaning to information. Among its virtues, it provides a clear guide to how to organize the raw data (chronologically, with a beginning, middle and end), and a sense of causation. It can be a powerful way of knowing, even when dealing with the more reductive information forms of credit scores today.[20] By connecting one event, one behavior to another, narrative builds a sense of predictability and outcome. As facts are marshaled into a story, it becomes clear what caused what, as well as the lessons and inferences to be drawn. By linking seemingly random occurrences into a meaningful pattern, narrative distinguishes the vital from the inessential, the necessary from the ephemeral.

Although many discussions of nineteenth century credit reporting stress the role of character—the traits of an individual that predicted a likelihood of payment—character was only one element of the narrative. Narrative put character into motion, giving both micro level detail as well as macro level context. It pointed to a conclusion, but avoided direct judgment or advice, which would have overstepped the legally secure territory of confidentiality. Indeed, it was the non-fixed nature of character and identity that gave power and legitimacy to credit surveillance. One could rise or fall by one's own actions, as reflected in the plot of one's own life.

Scott Sandage has explicated the many culturally encoded meanings carried in the credit reports—of good and bad borrowers, or of those who deserved a second chance and those beyond hope of redemption. Narratives of business, credit and character have a long history, going well back into the early days of commercial society.[21] In starting the credit reporting agency, Lewis Tappan drew on this tradition by emphasizing the moral lessons his ledgers conveyed.[22] No one could object if the information clearly distinguished the deserving from the undeserving and followed the long history of prudence in lending money. The power of persuasion and authenticity in the credit reports came from this sense of narrative causation, which denied that occurrences were merely random and showed that the ledgers contained meaningful data. The ability of Dun reporters to shape field reports into compelling narratives both solved the problem of conflicting interests and legal precedent, while constituting a saleable product, built from the strategic advantages of information processing that Dun possessed.

Finally, the narrative mode fended off legal challenges and public criticism. By their very nature, narratives require the active participation of the reader. Although different narrative tropes may prefigure different causal mechanisms and imply different outcomes, the reader also brings his or her own ideas and preconceptions to the reading. Good narrative reports could both make sense out of messy detail and complex reality, yet leave the reader (the creditor) free to draw his or her own conclusions. Unlike modern, quantitative methods of credit reporting, it was much harder to show in a court a clear connection between the language of the report and a decision by a creditor.[23]

Narrative proved extremely durable in trade credit reporting. To see this, consider the counter case of the credit ratings books. Ratings were introduced by R. G. Dun

competitor John Bradstreet in 1857. The Bradstreet rating system gave the appearance of objective, quantifiable data, but in fact it was originally simply a way to encode narrative information. The ratings were decoded with a key that told the reader if the person was of "good character" or a "slow payer." This method had communications advantages. It was easier to distribute and periodically update the ratings book than to have merchants call at the office. By using a code, Bradstreet avoided the legal danger of circulating information outside the umbrella of privilege. But his rating book was more like the telegraphic code books of the era—substituting a single word or number for a common phrase as a way to reduce the cost of transmitting information.[24] Ratings, in this incarnation, still constituted a narrative.

R. G. Dun resisted entering the ratings book competition, but eventually it did so, with a more quantitatively based product. The Dun book actually connected a value—a firm's capital worth—to a rating (A, B, C). It provided as well a non-quantitative assessment, a boiled down version of the narrative in the form of a rating letter reflecting "willingness to pay." But the ratings were an innovation that had more to do with competition between reporting firms and efficiency of information conveyance than with content and form. The Dun rating book, for example, made tracking borrowers much easier. It assigned a unique number to each firm in its index. The index, however, was a functional appendage to the narrative reports, not an alternative; that is, it enabled users to get more frequent report updates. Here Dun took advantage of another part of the information assemblage, daily newspapers. Whenever new information arrived, Dun would post a newspaper advertisement to "call at office" concerning X firm, identified not by its name but by its number. Since the code was only decipherable by clients holding a

rating book, Dun protected itself against the charge of libel, while allowing patrons to update their information regularly. Non-subscribers, of course, had no way of free riding, since they knew neither the firm being referred to, nor the new information that had arrived.[25]

In its promotional literature Dun reminded clients that the ratings implied no endorsement or recommendation—they were not to be used as a simple scoring methodology. And it made sure to price the ratings books so that they did not undercut the detailed reports.[26] Nor did the ratings, even those for capital worth, reflect hard, standardized data. Many, indeed most of the firms that were rated either kept rudimentary books, or none at all. Without widely used and accepted standards of accounting, calculations of net worth were done on a case by case basis by individual agents. Instructions from the New York office provided general guidance on how to do this, but both the raw data and final figure reflected the judgment of the agent.

It was of course in Dun's self-interest to maintain the narrative reports. By the late 19th century, the firm had accumulated a substantial databank of information and a well-established network of clients, contacts, agents and credit subjects. Sustaining this network was expensive. New offices meant more sites in the information node. To improve the quality and depth of information, and to reduce the problem of conflicting incentives, Dun replaced the unpaid local attorneys with salaried employees, and instituted a stricter administration to direct and guide their work into a well-researched but standardized product.[27] But there was little incentive for Dun to make ratings so reductive and precise that they replaced the detailed reports on which the ratings where based; and

precise ratings might well have been taken as endorsement or rejection of a particular debtor, raising the danger of law suits.

Despite the increased speed and compactness of the rating book, there was simply too much variation from case to case to allow ratings to fully replace the narrative. The rating for creditworthiness (willingness to pay) was conceptually distinct from the rating for capacity (capital worth). Yet, as Dun admonished, it was impossible to rate a small local retailer A for credit when A was the highest rating that could be given out to a giant merchant like Marshall Field, whose capacity and capital were obviously many times larger. But lowering the rating of the local merchant distorted the information about willingness to pay. If credit reporting substituted for the watchful eye of the lending merchant, it could not use a rating system missed nuance and subtlety. There was, moreover, little evidence that the rating scheme was predictive of failure, or even that a firm would be rated the same way by two different agencies.[28] Finally, credit decisions by lenders were based on a variety of considerations—how good a customer the borrower was, how many other customers were in that market, the need to expand sales.

Efforts to create a different reporting system, one based more on shared, quantifiable data also failed to displace the narrative reporting style. By the late nineteenth century, merchants began to organize in trade associations and to professionalize the credit function.[29] High on their list of goals was ledger exchange, whereby lenders shared with each other the credit and payment behavior of their customers.[30] In this way, the credit men argued, they would have an objective basis for credit decisions. They pressed R. G. Dun and other reporting agencies to collect ledger information as well.[31]

Ledger sharing, however, never became the dominant practice in trade credit.[32] Even in 1920, 70% of orders were made using credit agencies as the information source, rather than shared ledger information. Merchants themselves were reluctant to pass ledger information on to Dun, which they saw as "giving information into the hands of those who will market it for money-making purposes."[33] A credit clearing house started by the National Association of Credit Men faltered.[34] For all the good will and expressions of solidarity in the literature of professional associations, the fact remained that sharing information ran against self-interest. Greater transparency eliminated informational advantages, particularly among the largest wholesalers who also had the best ledger data. "A very serious handicap, and one that seems to be growing," noted R. G. Dun, "is the refusal of many lending houses to give any information about their customers."[35] True, an effective credit information sharing system would have undermined Dun's business model. But the firm thrived because it mediated the conflict between merchants' desire for better information and their goal of keeping their own information private. Dun obtained information from all parties, but only gave out information after it had been processed into reports, thus keeping the source of the raw data secret.[36]

Thus through the start of the twentieth century, R. G. Dun and its narrative mode of reporting remained by far the most important source of trade credit information. This did not mean that the firm stood still. In fact, Dun innovated, but mostly in the direction of reducing the cost of producing narratives and increasing the speed of user access. Typewriters and manifold (carbon) paper allowed for processing multiple copies of reports at the same time, which could then be sent to regional offices. This ended reliance on the heavy ledgers and the expense of laboriously copying out the ledger entries in a new set of

books every time an office opened. The manifold distribution process sent copies of reports to the appropriate offices, based on likelihood of demand.[37] These offices in turn would be called upon to share information with other offices where necessary. To make the system self-supporting, each regional office cultivated its own client base, which made complete reportage both necessary (each office blanketed its own region) and also a strategic advantage—providing a system that could claim total national coverage.[38]

Rather than eliminating the narrative, Dun modernized it. It emphasized professionalism, standardization and organization.[39] It refined its instructions to agents, asking them to produce information in a more efficient form. But it also refined rather than deconstructed the art of the narrative form. Writers were admonished to avoid trite or stock phrases. "The business facts usually tell their own tale," reporters were reminded, yet they were also told how to shape that tale in a way that would reveal important insights, such as "if the history of the individual or firm discloses uniform success for many years," which was assumed to provide "evidence of the standard virtues."[40] Reporters aimed to filter out the trifling details while providing a chronology of the major developments in the subject's life. They practiced their craft until they developed an intuitive "agency sense" of how much detail to include, when and how much to revise information from period to period.[41]

Into the twentieth century, business opinion was split on the virtues of this narrative system. The tireless promoter of credit science, Peter Earling, claimed that the handling of credit information had "undergone a radical change" at the end of the nineteenth century toward a more quantitative form. "The dispensing of credit had been reduced, if not to a science, at least to a study on scientific lines," he wrote.[42] But others

were not so sure, in an age when business and financial data were still haphazard and idiosyncratic. "Our impressions of men and things seldom proceed from logical deductions," opined T. J Zimmerman in his 1904 book on credit. "They are intuitional, and an ounce of intuition is worth a pound of logic when we come to reckon with human nature and its manifold ramifications."[43] Even ratings on capital worth had to be understood as judgments. "It would be impossible to attempt a description of the relative credit of merchants," agreed William Prendergast in his 1906 book *Credit and Its Uses*."[44] Printed forms, ledger data, field reports from salesmen could all help but the fact remained, "in no field of credit information are better results secured than through the instrumentality of oral investigations."[45]

With the growth in lines of trade and the geographical dispersal of business in the twentieth century, credit managers faced an informational dilemma. They were "frequently overwhelmed with a mass of voluminous reports." [46] At the same time, they believed that they could not have too much information, and so read reports carefully lest some important fact slip by. Attitudes toward risk varied almost firm by firm, and different lenders employed different credit strategies—some seeking to minimize losses, others to use credit liberally to build sales. Most therefore adhered to "Hoyne's Law:" When in doubt, get more information.[47] The best credit reporters learned to express important facts with brevity and conciseness, while the best credit managers learned to summarize reports, create briefs and paste the briefs into a card or ledger system for future reference. These information handling methods made it possible to track a greater volume of debts over a longer period of time, but they supported rather than supplanted the narrative mode of assessing and judging credit worthiness.

Over time, R. G. Dun developed new forms of information, either to provide greater context or to differentiate levels of detail. Registered Supervised Reports delved into business methods and practices, while more extensive Analytical Reports included information on personnel, subsidiaries, and so far as possible, banking.[48] At the same time, Dun expanded beyond mercantile credit to survey manufactures, brokers, and independent tradespeople and professionals—from blacksmith and grain dealers, to dentists and publishers. The sheer scale had increased, to some 1.3 million ratings, which required 750,000 changes per year and the answering of 5,000 requests per day.[49] But we should not mistake size and scale for transparency. Indeed, the greater complexity of credit reporting meant multiple information sources, more competing products, and "extra" data to satisfy merchants' desire for more. If transparency means an agreed upon standard of information and clear criteria for decision making, credit reporting was far from that.

Dun's competitive success if anything required it to gather more information than necessary for efficient credit evaluation. It provided many facts so as to avoid the appearance of bias or opinion, dangerous legal territory inviting libel suits.[50] As guides for reporters put it "Don't give advice; when you have submitted all the facts in your possession, Stop!" [51] Safe legal advice to be sure, but on its own it made meaning and precision in reporting more difficult to achieve. The narrative thus offered a way to subtly shape and direct the attention of the reader, steer clear of legal entanglements, and provide the variety of data that credit managers said they needed. "The report is a story," noted the Dun guide to report writers, an effective story well told. It was written in plain, non-technical language, without lengthy digressions. It built in chronological stages until reaching a climax.

In all, the narrative style proved remarkably durable. "There has been no fundamental change in Agency reporting in the last fifty years," stated the Dun handbook in 1944, "simply because there has been no change in the attitude of creditors toward debtors, actual or prospective. "[52] Even though Dun continued to offer numerical ratings, the story had to illuminate and justify the ratings, which in turn had to be set to reflect the facts of the story. Improved information technology allowed for faster processing and distribution, greater range of factual data, and cross referencing of other information sources. Dun, or after 1934 Dun & Bradstreet, rode the wave of post-World War II information technology, microfilming and shipping trade data to regional offices, instituting a numbering system to allow businesses to identify themselves in machine readable form (the Duns Universal Numbering Systems, D U N S).[53] In certain trade lines where speed was of essence and information turned over rapidly--as women's apparel and dry goods--the Credit Clearing Division provided a limited degree of credit scoring.[54] Yet for the most part the craft nature of trade credit reporting remained. Company literature continued to stress the expert agent or reporter who "observes his community," and the many close-at-hand regional offices, as the legitimate structure for gathering sensitive data.[55] Following the trend in consumer reporting practices, Dun & Bradstreet in 1974 created a predictive scoring algorithm, DUNSCORE, using accounts receivable data from firms that had computerized their accounting.[56] But many firms did not participate in this system, and banks, a major source of credit information, were still reluctant to share customer information. [57] In 2001, Dun & Bradstreet conducted some 4 million interviews and sent out 1 million direct mail requests, compared to 94,000 cases of shared trade data and 200 banks sharing credit information. [58]

Consumer Credit Reporting

Consumer credit reporting followed a different path than that of trade credit. Although consumer credit also relied on narrative techniques initially, it shifted toward a reductive, "hard," quantitative signal in the 1970s and 80s. The reasons for this lie in the different set of actors in the consumer credit reporting market, the different structure of interests, and the different legal, political and cultural context.

Although perhaps not as old as trade credit, consumer credit has a history that extends back into the nineteenth century, and in some forms, to pre modern times. Family, ethnic group members, private lenders, and pawnshops have been used by individuals for loans and credit since at least the late middle ages, and probably much earlier. Book credit for consumers seems to have been commonplace in rural stores and among urban retailers for several centuries. Butchers, bakers, saloon keepers, and grocers carried their customers' charges month to month.[59] These long standing practices were monitored by the close local connections that bound debtors and lenders, which allowed behavioral monitoring. Put simply, one did not generally lend or extend credit to true strangers. Where credit was more widely and generally granted, it was still restricted to certain presumed safe categories of people. Urban department stores offered book credit to their better customers, but more as a service and convenience than a source of profit.[60]

Formal, contractual types of consumer credit arose at the end of the nineteenth century to finance purchases of durable goods. Furniture and pianos could be acquired using chattel mortgage contracts by the 1870s and 80s, while the ubiquitous Singer Sewing machine was available on installment from the 1860s. By the twentieth century, consumers could use installment payments to buy large items, notably the automobile, as

well as smaller household articles, through credit available via finance companies.[61] Department stores continued to offer book credit. For smaller, personal loans, salaried workers could turn to lenders who executed contracts that required repayment over a period of months in regular installments.[62] In all, by 1929, roughly 20% of all retail sales were made on credit.[63]

Credit monitoring and reporting for the consumer market was done through a variety of mechanisms. Agents and sales people maintained close contact with installment purchasers, while the chattel mortgage contracts gave lenders recourse through reposition. As much as anything, repossession was a disciplinary technique through embarrassment, as the borrower imagined in horror the family sofa or piano dragged out of the house. Personal loans depended on the relative stability of employment in large firms, which was more common by the twentieth century, as well as the regularity of a paycheck that corporations could provide. To assure compliance with repayment, lenders threatened to contact employers and garnishee wages.[64]

Information serving the consumer credit market at first resembled that in trade credit--diverse forms of data, assembled a file, constructing a life narrative. Investigators sought close familiarity with debtors. Chattel mortgage lenders, for example, took careful inventory of the homes of borrowers, both to record in detail the property securing the mortgage (making repossession easier) and also to assess the character of the borrower in the most personal of settings.[65] Uncertainty about what information mattered and a desire to accumulate potentially useful data drove credit reporting on personal and consumer loans in the early decades of the twentieth century, much as it continued to drive trade credit. Since even more than trade credit, consumer credit was locally based, thousands of

credit bureaus across the nation performed this function, in addition to the in-house files kept in retailers' credit departments.

By the 1920, the patterns of reporting in consumer credit started to diverge from those in trade credit. Where wholesalers found it difficult to share information on their borrowers, this was not the case with retail stores. Where trade credit was not easily reduced to a scoring system, consumer credit began accumulating data of the form that made scoring much easier.

Stores tracked their customers carefully. They used coins, tokens and charge cards to monitor customers' lines of credit and identify patterns of purchases. Perhaps the most notable and effective of these tracking systems was the Charge-a-Plate, first adopted by Filene's Department Store in 1929, then spreading to other stores in the 1930s and 40s. A metal square embossed with the customer's name, address and account number, charge plates were run through a machine at the counter, automatically imprinting the identifying information on the sales slip. By filing the sales slips, the credit department was assured of an accurate report on credit use at the individual level.[66] Charge plates can be seen simply as a more elaborate, if still paper based data system, similar to the ones that Dun and other credit reporting agencies were adopting. It fit the general move toward "systematic" office management in the 1920s.[67] But it also marked a differentiation between consumer and trade credit practices, by giving the retail lender much more control over credit information.

Stores overcame the inhibitions on data sharing that remained among wholesalers. The Boston Retail Trade Board designed a common plate with notches that would fit in the machines of each store with whom the customer had an account. Board members agreed

to treat each other equally, so that one store did not use the commonality of credit to steal customers from another. This system also disciplined free riding, by mandating that each time a customer opened a new account, that store would conduct an independent investigation of creditworthiness. Charge plates, and the assemblages of institutions and practices they embraced, helped to overcome the classic "chicken and egg" problem of credit and credit reporting. Stores were willing to share information because their customers were part of a single monitoring network. Customers had incentive to join the network because it was simple and convenient to use the same charge plate in multiple locations.[68]

Stores were now able to capture behavioral patterns. They could see if an outstanding balance had just been incurred, or had been paid down from a higher amount over time. Dates of purchases, amounts, and "back ledger" data from past transactions provided a new range of insights on the borrower.[69] At the same time, store customers were less mobile, and lived in a smaller information bubble than did business borrowers. Word that someone had failed to pay an account at one store quickly spread to the others because consumers had limited options about where they could shop and who would give them credit. Using standardized data derived from the ledgers of all creditors using the same credit monitoring device, department stores were able to devise a basic "rating" system.[70] They began to turn the narrative history of each customer into a more reductive norm of expected payback.

When the Depression hit, stores became especially concerned about maintaining control of credit. The older, neighborhood based, personal knowledge system frayed in the Depression, yet credit was more important in retailing than ever before. By 1938, credit

sales had risen to $7.8 billion, or 25% of all retail sales, up by 5% from 1929.[71] Stores feared that customers might begin to pyramid accounts as they struggled with unemployment and lost wages, or would learn to game the reporting system in their favor. Warned one credit reporter in 1936, "a common occurrence is the discovery that the customer has set a trap into which he has invited the investigator to step by giving false information concerning his business connections and arranging it so that person at the business location will confirm his misstatements to enable him to obtain credit."[72] Such concerns drove credit and ledger sharing arrangements, as department stores expanded their cooperative information system to cast a wider net.

For this they relied on independent credit bureaus, thousands located in towns and cities across the nation.[73] Credit bureaus used a labor intensive process of gathering, maintaining and updating files containing diverse information about individuals' finances, property, and personal lives. The bureau file included notions on divorces, liens, chattel mortgages, bankruptcies, marriages, deaths, and "skips" (leaving town without paying a bill). Credit bureaus also collected information on a far larger number of individuals than a single store or group of stores. Though highly localized, credit bureaus developed an effective means of interchanging data—in part because the localized nature of the information meant that they were not in competition with each other. Retailers were wary about revealing information on customers that could fall into competitors' hands. But they were willing to send ledger, trade and payment information through the local credit bureau, which in turn maintained an information network across the nation through a trade association, the Associated Credit Bureaus of America. Mail and telephone, particularly the growth of a fast long distance telephone network by the late 1930s (and

even faster direct dialing of long distance calls by the 1950s), made interexchange of data among brother credit bureaus efficient and effective, giving credence to the industry's motto, "Your Credit Bureau Follows You like a Shadow."[74]

As the monitoring of consumer credit expanded to a national scale, credit scoring and reductive quantitative scoring actually decreased for a time in favor of richer contextual data. Indeed, the expansion of consumer credit made it difficult to determine what information to include and what to filter out. Looking to the mixed experience of ratings in trade, consumer credit managers argued that rating books were old fashioned and went out of date too quickly. Instead, the bureaus emphasized the thickness and thoroughness of their files. The goal was to share information to create "one big file," ideally one that would "show a complete cross section of every individual's obligations."[75]

Detailed data had strategic advantages. After World War II, retailers sought potential new recruits for credit—which was now recognized as a key tool of selling. Credit bureaus could identify individuals who used installment credit, or track names and addresses appearing on COD labels—a noncompetitive source of new customers for local stores. Or they could identify those who had just moved to town, or newlyweds, or those who just ordered utility service or joined clubs. The richness of the data enabled stores to make strategic decisions as to which classes of customers they wanted to cultivate—by income, age, occupation and race. [76]

The Rise of the Machines

Through the 1950s, consumer credit depended on a highly diverse, yet interconnected system of information collection. That began to change. It started with the articulation of

new psychological theories of behavior, and discussions of their application to credit practice. "We cannot observe changes in behavior unless we watch what a man *does* and stop cataloguing what he 'is' …for such cataloguing nearly always carries the implications of permanence and puts us off guard for change, " wrote credit manager Helen Sommers, an advocate of "credit psychology." Such connections could be established probabilistically, though Sommers did not abandon narrative and causation either. Ask not, she advised, "Is he honest, is he smart?" but rather "what has he been doing, how has he solved past problems, what tests of debt discharging responsibly has he met or failed to meet."[77] As the credit manager for Trojan Hosiery Mills, Sommers was addressing the concerns of manufactures and wholesalers, not retailers. As it turned out, though, it was the retail end of the business that more quickly adopted the behavioral model. The reason, however, had to do with the market for retail credit, its institutions, organization and history, and not with ideas, methods or technical expertise.

Although retailers had developed an extensive credit reporting apparatus, they had done so largely to monitor fixed, open book credit. By the 1950s, however, charge cards offering revolving credit began to appear, eventually supplanting then replacing store based credit.[78] Store credit was monitored by the detailed files that retailers kept in their back offices, shared both locally and, through credit bureaus, nationally, for accounts that were paid off monthly. Charge cards offering open ended, revolving credit, made it much harder to use the "stable" categories of character or personality, which as Sommers noted, could leave one off guard for change.

The success of credit cards required overcoming another "chicken and egg" problem. Retailers would only begin to accept credit cards if they were popular and in

general use, but consumers would only sign up for cards if they were widely accepted by retailers. Credit cards had advantages to stores, particularly small ones, since they eliminated most of the record keeping, financing and monitoring costs associated with store based credit. But in outsourcing credit, retailers lost control of the credit monitoring function, and hence the ability to control risks and promote sales. Given how much retail merchants had invested in gaining control of and insight into their credit customers, the bank issued credit cards had to come with some inducements. One was protection against loss or fraud by card users; another was data on sales and purchases by customers.

That took care of the chicken, but what of the egg? What would induce customers to sign up for cards? The answer was mass mailing. In 1957, Bank of America introduced the BankAmericard by sending it to some 60,000 California customers, and foregoing the usual credit background checks.[79] It worked, and the card gained wide acceptance by merchants and customers both. Nonetheless, Bank of America had to sustain heavy losses in the early years and other banks moved cautiously to follow the leader. When Chase Manhattan Bank unveiled its charge card a few years later, it eschewed the mass mailings and screened customers the traditional way. As a result, it failed to convince merchants to accept the card.[80]

Credit cards would work only if banks moved aggressively in signing up customers and merchants. To do so banks needed an effective system of credit monitoring and fraud control. In this way they could pre-select cardholders and guarantee stores payment. The capacity to continuously monitor credit use was key. Bank of America had designed its credit card plan following the installation of its ERMA (Electronic Recording Method of Accounting) system a few years before, to speed check processing and account balancing.[81]

By 1957, ERMA and related information technology investments yielded more sophisticated databases that could connect different forms of information to create composite pictures of the borrower, one reason Bank of America was willing to try the mass mailing. As credit cards spread outside of a single bank customer base, however, some means of tracking users across regions and among financial institutions was needed.[82] This required information sharing.

In contrast to trade market, the consumer market already had a means of credit information sharing, through retailer cooperation and credit bureaus and associations. Before 1920, consumer credit trade associations had established a common language for ratings and had standardized data reporting, so all information, regardless of location, was comparable.[83] When national retailers, such as Sears, computerized their accounting systems in the 1950s, the industry association provided assistance to independent credit bureaus in accessing this data, obtaining the monthly computer tapes and distributing them to members, after converting the various ledger setups into a single format.[84] In the 1960s, the small, scattered credit bureaus also began to merge, creating larger databases of information on consumers. Although banks had traditionally been reluctant to share customer information, the larger credit bureaus adopted computer and electronic data processing, which aligned their information structure with that of the banks, so that information could be shared by exchanging computer tapes.[85]

Finally, new actors from the electronics industry entered the credit reporting market in the 1960s. Their presence was especially important to credit cards. Taking advantage of increasing computer processing power, they designed credit verification systems that allowed merchants to query charges in real time, which meant that credit

cards could be used securely for store purchases, with little waiting. The early systems were "semi-automatic." A merchant telephoned in a credit charge to the bank, where a clerk accessed the computer. Still, even by 1964 a transaction could be confirmed or declined within 90 seconds.[86]

Companies with expertise in electronics and information further promoted credit information sharing and data consolidation. In 1969, TRW acquired Credit Data, which had started in the 1930s as the Michigan Credit Association, a bureau serving retailers and merchants in that state. Credit Data had embarked on the shift from manual to computerized methods in 1965, but TRW completed the process, operating a large mainframe in Anaheim, California with 50 million names, selling "credit profiles" on request to lenders. Those who availed themselves of TRW's credit reporting service were required to share their data on customers and borrowers.[87] In other cases, existing independent bureaus and regional systems managed the shift to new methods and technologies, notably Retail Credit Company of Georgia, which transformed itself into Equifax. By the late 1960s consumer credit reporting was clearly moving to consolidation and to sharing information in large computerized databanks.[88]

Banks had initially set up credit card approval and authorization systems to cover their own customers, but by 1966 two nationwide card associations were in operation, National Bank of Americard, Inc., or NBI, and Interbank Card Association. NBI changed its name to VISA in 1976, and Interbank evolved into MasterCard.[89] Eventually these networks would grow to include over six thousand banks each (1998 figure), and spur a nationwide competition that drove down interest rates and increased access to credit. Initially, however, their most important achievement was in information sharing, allowing

for the construction of a rapid nationwide verification system, while also accumulating vast panels of data that helped to underwrite consumer credit marketing.[90] As they came to dominate the verification and data interchange business of credit cards, the card associations promoted use and acceptance by guaranteeing payment nationwide and simplifying payment clearings between banks.[91]

By the mid 1970s, all the elements of a revised consumer credit reporting structure were in place. Banks, merchants, and credit bureaus exchanged vast quantities of data on consumers, ranging from transaction and payment experience, to the more traditional personal data, now in standardized, machine readable form. Although twenty years earlier, consumer credit reporting was controlled by retail merchants, banks and local credit agencies, these organizations had been replaced or supplanted by a few large entities, notably the card association and a handful of giant credit bureaus. With information on consumer credit standardized and centralized in this way, it became easier for credit reporting to be done using quantitative data and the probability based algorithms first outlined in the 1940s and 1950s. Numerical credit scoring, started in rudimentary form in the 1950s, bloomed amidst a fertile sea of data, culminating in the FICO score, introduced in the 1980s.[92]

One final factor should be noted in this shift, one that again contrasts the institutional context of consumer credit with trade credit—the law. Whereas as we have seen, legal precedent forced Dun and other credit reporting agencies to tread lightly, walking a fine line between restricting the spread of credit information and distributing it in an efficient manner, nearly the opposite was the case in consumer credit. As reporting moved to its computerized, quantitative form in the 1970s, the law if anything put a

premium on reducing the variety and personal nature of consumer data, while making credit information more widely available.

Reacting to charges that individuals were denied credit based on innuendo, hearsay and lifestyle choices irrelevant to risk, Congress passed the Fair Credit Reporting Act in 1970. The act required reporting agencies to maintain accurate files, purge unverifiable information and permit credit seekers to access and correct their files. It took particular aim the investigative procedures used by the traditional credit reporters, the gumshoe agencies that had for decades gathered both personal and financial information on consumers. In 1974 responding to pressure by women's rights organizations, Congress added the Equal Credit Opportunity Act, which forbade credit discrimination on the basis of sex or marital status, undercutting the long tradition of rating women lower than men for credit and giving credit to married women only through their husbands. The act also banned the use of certain categories pertaining to race and ethnic status.[93] Finally, in 1976 Congress opened hearings on privacy and the private sector, following on a number of investigations about records and data on citizens held in government agencies.

The upshot of the legislation and investigations was to make computer data banks and behavioral or transactional information the answer to concerns about privacy or prejudice. If women or African Americans were denied credit because wittingly or consciously credit evaluators took race, marital status, or personal lifestyle into account, then credit scoring based strictly on patterns of credit use, plus a limited number of individual attributes (such as address or occupation) provided a defense against charges of discrimination.[94] If the rich and varied records on individuals kept by thousands of small credit bureaus were considered unsecure and liable to misuse, then highly standardized

data available only by those with authorized access, overseen by a small number of large corporate entities, provided greater security and superior accuracy.[95]

While the privacy hearings considered the danger that corporate databanks centralized too much information, investigators in the end only recommended better security procedures, enacted by computer professionals, rather than limits on the size of those databanks. What the investigations pointedly did not do was recommend legislation comparable to the 1974 Privacy Act for government. For all the dangers posed by databanks in a free society, their potential to eliminate traditional forms of discrimination through hard data, combined with the efficiency they offered to credit granters, made them appear more equalitarian and less liable to abuse than traditional methods that emphasized character and the narrative of lifestyle.[96] In accord with previous legislation on credit and lending, notably the Consumer Credit Protection Act, the belief was that more information processed more cheaply and encompassing more people would lower the cost of credit to the poor and minorities, while increasing transparency to protect the consumer or borrower.[97] All these outcomes required, it was argued, the shift to the new, high powered computerized credit reporting systems, and the move to quantifiable, standardized forms of information, to what looked like an objective credit score.

The FICO Moment

Credit scoring relied on probability and correlation linking certain variables connected to a borrower to certain outcomes, notably probability of repayment. This was a powerful tool of prediction when applied to populations, but it did not incorporate a causal model of individual behavior, as had the narrative methodology. Since almost any strong correlation

can be predictive of outcomes, the scoring models themselves did not set limits on what should be included and what should be left out. In theory, race, religion, ethnicity, gender, location, job, level of education could all be statistically valid predictors of repayment.[98] In an attempt to shift credit scoring to a causal basis, congressional investigations and laws pushed credit reporting firms to rely less on databanks of personal characteristics and more on credit and payment experience. Behavioral based assessment seemed fairer—since it was one's most recent actions that determined the credit score. Although the legacy of discrimination and poverty still worked against those with little or no credit history, expanding access to credit would, presumably, correct that problem in time.

The FICO score, based largely on recent past behavior, was almost 180 degrees from the narrative in form. It denied rather than affirmed the notion that credit should reflect a notion of moral character. Yet like the narrative, it both selected information for decision making out of vast sea of facts, and directed the decision maker toward certain conclusions. Like narrative it presumed that people rose and fell of their own accord, once context was properly account for, and allowed for second chances. The credit score, like the credit narrative, was a temporarily stable artifact of meaning emerging out of conflicting institutions, interest and policies. But as an artifact, it hid its origins and limitations. It became a widely accepted black box, put to use for all sorts of new tasks.

In the 1990s, general acceptance of the FICO score led Freddie Mac to use it for mortgages as well. With credit ratings attached to individual mortgages, bond rating agencies were then able to rate packages of asset backed securities. Indeed, without FICO, Standard & Poor's and other bond raters would have lacked the method to rate individual mortgages composing the tranches of debt obligations.[99] Scalability of risk measurement,

standardization of information, and reduction of complex individual data into a single, universally recognized score made mortgage underwriting and securitization easier, and allowed for finer distinctions among risk pools. But it was a method that was only valid to the extent that recent past behavior predicted future behavior, based as it was on the shallow information compressed into the FICO score. It worked best when conditions in the future were very much like those of the past, and became unstable in the face of sudden changes in conditions or behavior. The history, and hence assumptions and limitations of FICO, were either lost or ignored. The consequences of ignoring history we are living with still.

Conclusion

In most studies of credit, risk and reporting, information has been treated ontologically—as tending toward a state of perfection, idealized as transparency. In this study, I have argued that information should be treated epistemologically, as the artifact of certain agreed upon conventions arising out of the construction of a system of knowledge. Seen this way, information cannot be the cure for market imperfections, opportunism, self-interest and uncertainty, because information itself is derived from a social process no less characterized by self-interest and no less institutional than the markets it is meant to regulate. Thus, the recent breakdown in financial market risk assessment might be seen, traditionally, as a problem of insufficient transparency. But it might also be treated, on a deeper level, as a problem rooted in the institutional nature of knowledge.

As Charles Perrow has noted, great disasters happen when actors assume they fully comprehend complex systems and are confident those systems generate information that

can reveal dangers in any given situation.[100] But systems only reveal what they are designed to reveal. When conditions diverge strongly from those that existed when the system was designed, the information will be inadequate to the task. The accumulation of information works against transparency, either overloading actors and making it difficult to separate signal from noise, or creating new informational asymmetries. As information gets noisy, actors tend to focus on a few predictors, the ones (as in Perrow's complex technologies) generated by the most salient behaviors in the system at that moment. It then becomes more not less difficult to see the black swan.

Since information systems, as I have argued, emerge historically, out of contingent conditions, growing without a master plan, reflecting institutional barriers, negotiating the interests of different parties, there can be no perfect information system. There can be no point to stand outside the system and monitor it, but only another information system, equally contingent, equally institutionalized. We might, however, gain some insight and avoid some disasters if we learn and study the history of information systems. Then, at least, we might see the risks and unknowns built from our attempts to manage risks and unknowns.

Notes

[1] http://abcnews.go.com/Business/wells-fargo-mortgage-loan-application-raises-questions/story?id=11488296&page=2

[2] Joseph Stiglitz and Andrew Weiss, "Credit Rationing in Markets with Imperfect Information," *American Economic Review* 71 (1988), 393-410.

[3] Even money must be surveilled. Stephen Mihm, *A Nation of Counterfeiters: Capitalists, Con Men, and the Making of the United States* (Cambridge: Harvard University Press, 2007).

[4] The Code of Hammurabi three thousand years ago regulated credit and interests rates. For an overview of consumer credit in history, see Rosa-Maria Gelpi, Francois Julien-Labruyee**,** *The History of Consumer Credit: Doctrines and Practices (*New York: St. Martin's Press, 2000).

[5] In what is much the same thing, credit used primarily to lubricate sales will spur a competitive round of customer poaching.

[6] Margaret J. Miller, "Credit Reporting Systems Around the Globe: The State of the Art in Public Credit Registries and Private Credit Reporting Firms, in Margaret J. Miller, ed., *Credit Reporting Systems and the International Economy* (Cambridge, MIT Press, 2003).

[7] The general history of mercantile credit and credit reporting in nineteenth century is well covered in Rowena Olegario, *A Culture of Credit: Embedding Trust and Transparency in American Business* (Cambridge, Harvard University Press, 2006); James Norris, *R. G. Dun & Co. 1841-1900: The Development of Credit-Reporting in the Nineteenth Century* (Westport, CT: Greenwood Press, 1978); Lewis Atherton, "The Problem of Credit Rating in the Ante-Bellum South," *Journal of Southern History*, 12 (Nov., 1946), 534-556. I have especially benefited from the insights of Barry Cohen on R. G. Dun.

[8] David Evans and Richard Schmalensee, *Paying with Plastic: The Digital Revolution in Buying and Borrowing* (Cambridge, MIT, 1999), xi-xii.

[9] The problems of collections, bankruptcy and order of payment discussed in Olegario, *Culture of Credit*, 156

[10] Olegario, *Culture of Credit*, 167-8.

[11] Quoted in Josh Lauer, "From Rumor to Written Record Credit Reporting and the Invention of Financial Identity in Nineteenth-Century America," *Technology and Culture* 49 (April, 2008), 301-24. See also Scott Sandage, *Born Losers: A History of Failure in Americ*a (Cambridge: Harvard University Press, 2005), 150.

[12] The problems of nineteenth century bankruptcy are discussed in Edward Balleisen, *Navigating Failure: Bankruptcy and Commercial society in Antebellum America* (Chapel Hill: UNC Press, 2001).

[13] Lewis Tappan quoted in Norris, *R. G. Dun*, 22.

[14] Quoted in Sandage, *Born Losers*, 143.

[15] "Mercantile Agency," New-York City and Co-Partnership Directory for 1843 & 1844 (New York: John Doggett, Jr., [1843]), n.p., quoted in Lauer, "From Rumor to Written Record."

[16] Olegario, *Culture of Credit*, 128, 141. Anthony Giddens has noted that when money made possible anonymous transactions and exchange over long distances, it also meant that parties to exchange lost touch with each other, requiring new means of surveillance and verification in the economy. Anthony Giddens, *Contemporary Critique of Historical Materialism, Vol I: Property Power and the State* (Berkeley, University of California Press, 1981), 115-117.

[17] Norris, *R. G. Dun*, 26.

[18] To be clear, I am making a distinction between transparency and simply "more information." Credit reporting clearly conveyed information, but to assume that transparency simply equals a quantity of information is to make the term transparency superfluous.

[19] Ormsby v. Douglass, 1858 is a key case in this respect, ruling that information conveyed in good faith with reasonable diligence was protected under privilege.

[20] Robyn M. Dawes, "A Message from Psychologists to Economists: Mere Predictability Doesn't Matter Like it Should (Without a Good Story Appended to it)," *Journal of Economic Behavior & Organization* 39 (1999), 29–40.

[21] Daniel Rabuzzi "Eighteenth-Century Commercial Mentalities as Reflected and Projected in Business Hand Books," *Eighteenth-Century Studies,* 29:2 (1995-1996), 169-189; John Smail, "The Culture of Credit in Eighteenth-Century Commerce: The English Textile Industry," *Enterprise and Society,* 4:2 (2003), 299-325.

[22] Sandage, *Born Losers*, 147.

[23] On narrative form, see Hayden White, *Metahitory: The Historical Imagination in Nineteenth Century Europe* (Baltimore, Johns Hopkins University Press, 1973).

[24] Norris, *R. G. Dun*, 51-2.

[25] Norris, *R. G. Dun*, 55

[26] Norris, *R. G. Dun*, 88.

[27] Norris, *R. G. Dun*, 115, 129-30.

[28] Norris, *R. G. Dun*, 93-4; Bruce G. Carruthers and Barry Cohen, "The Mechanization of Trust: Credit Rating in 19th-c. America," unpublished paper.

[29] Olegario, *Culture of Credit*, 175-179; 189.

[30] William Prendergast, *Credit and Its Uses* (NY, D. Appleton, 1914 [1906]), 203.

[31] Prendergast, *Credit and Its Uses*. 183-4. New York apparently passed a law that required merchants who obtained credit by representing that they kept books would be guilty of fraud if they defaulted and could not present the books to the creditor.

[32] Olegario, *Culture of Credit*, 187, 194. Nor did another practice that professional credit managers touted succeed—signed, legally binding statements by the borrower merchants.

[33] Prendergast, *Credit and Its Uses*, 213.

[34] Olegario, *Culture of Credit*, 190-91.

[35] *Bulletin of the National Association of Credit Men*, Series of 1909 (NY, National Association of Credit Men, 1909), 468.

[36] *The Mercantile Agency Reporters' Manual*, 4th ed. (New York: R.G. Dun & Co., 1918), 27.

[37] Norris, *R. G. Dun*, 136-9.

[38] Norris, *R. G. Dun*, 44

[39] Norris, *R. G. Dun*, 129, 135.

[40] *Detailed Instructions to Reporters and Report Writers on the Arrangement of Reports* (New York: R.G. Dun & Co., 1918), 5.

[41] Baker Library, Harvard Business School, R. G. Dun Collection (Dun Collection), *The Mercantile Agency Reporter's Manual*, 2nd ed. (New York, R. G. Dun & Co. 1902), 1, 7-8, 11.

[42] Earle, quoted in T. J. Zimmerman, ed., *Credits and Collections* (Chicago: The System Company, 1904), 1. The same attitude toward information is repeated in later handbooks on practice. See *Mercantile Credits: A Series of Practical Lectures Delivered before the Young Men's Christian Association of Los Angeles, California* (NY, Ronald Press, 1914).

[43] Zimmerman, *Credits and Collections*, 5, 47.

[44] Prendergast, *Credit and Its Uses*, 151, 159-63.

[45] Prendergast, *Credit and Its Uses*, 185.

[46] Zimmerman, *Credits and Collections*, 22.

[47] Alfred Terrell, "Systems for a Manufacturing House," in Zimmerman, *Credits and Collections*.

[48] Dun Collection, *Credit, Man's Confidence in Man* (New York: Dun & Bradstreet, Inc. [c1939]), unpaginated.

[49] Olegario, *Culture of Credit*, 161-3.

[50] In *Gibson v. Dun* the agency prevailed in a suit where a client lost money after basing a lending decision on information Dun had provided information that it consistently maintained was not in any sense a guarantee against risk or loss.

[51] Olegario, *Culture of Credit*, 153; *The Report Writers Guide* (New York: R. G. Dun, 1918), 5.

[52] Dun & Bradstreet, Inc. *Service Control Department, Report Writer's Guide: General Suggestions and Examples: Narrative Form Reports* (New York: Service Control Department, 1944 [ca. 1934]), 2-3.

[53] Changes in practice and products can be traced through the Dun & Bradstreet *Annual Reports*.

[54] Dun & Bradstreet, Inc., *Salesman's Handbook of Rates, Services and Policies* (Dun & Bradstreet, Inc., 1954).

[55] See Dun & Bradstreet, *Annual Report*, 1957, n.p. and *Annual Report*, 1970, 6.

[56] Dun & Bradstreet, *Annual Report*, 1974, 6.

[57] Olegario, *Culture of Credit*, 203. The reluctance of banks to share information was widely noted in the early twentieth century. See Prendergast, *Credit and Its Uses*, 172. For more on the art of narrative and the continued importance of the reporter and subjectivity in the report, see the R. G. Dun in-house publication, *The Wagon Wheel*, published in the 1930s, as well as *Dun's Bulletin*, through 1945, both in Dun Collection.

[58] Miller, *Credit Reporting Systems International Economy*, 46, 123-4, 135.

[59] Balleisen, *Navigating Failure*, notes in the 19th century people lived in a sea of credit. For more detail, see Thomas Clark, Pills, *Petticoats and Ploughs: The Southern Country Store* (Norman: University of Oklahoma Press, 1964 [1944]); and Atherton," The Problem of Credit Rating in the Ante-Bellum South."

[60] For overviews on the history of consumer credit in the United States see Lendol Calder, *Financing the American Dream: A Cultural History of Consumer Credit* (Princeton: Princeton University Press, 1999); Donncha Marron, *Consumer Credit in the United States: A Sociological Perspective from the 19th Century to the Present* (New York: Palgrave Macmillan, 2009); Louis Hyman, "Debtor Nation: How Consumer Credit Built Postwar America," Ph.D. dissertation, Harvard University, 2008.

[61] Martha L Olney, *Buy Now, Pay Later: Advertising, Credit, and Consumer Durables in the 1920s* (Chapel Hill: University of North Carolina Press, 1991).

[62] Michael Easterly, "Your Job is Your Credit: Creating a Market for Loans to Salaried Employees in New York City, 1885-1920," PhD dissertation, UCLA, 2008.

[63] Hyman, "Debtor Nation."

[64] Marron, *Consumer Credit in the United States*, 20-21; Easterly, "Your Job is Your Credit," 69-70.

[65] Robert W. Sharp, *The Chattel Mortgage Business, the Disease and the Remedy* (Newark: Newark Provident Loan Association).

[66] L. S. Bitner, "A Group System of Customer Identification and Credit Control," *First Annual Convention Proceedings, Credit Management Division*, National Retail Dry Goods Association, Chicago, IL, 1934. Filene's estimated it reduced errors 11%-13%.

[67] JoAnne Yates, *Control Through Communication: The Rise of System in American Business* (Baltimore, Johns Hopkins University Press, 1989).

[68] Bitner, "A Group System of Customer Identification."

[69] Theodore Kraft, "Getting Most out of Your Credit Bureau," *Second Annual Convention Proceedings, Credit Management Division*, National Retail Dry Goods Association, Chicago, IL, 1935, p. 19.

[70] Studies of the retail grocery trade by the Bureau of Research at Harvard Business School under Melvin Copeland identified poor accounting methods among retailers as a problem for credit evaluation. Copeland advised that stores adopt the Harvard System of Accounts for Retail Grocers, which he had helped to devise in 1914, a system endorsed by the Chicago Association of Credit Men. Baker Library, Bureau of Research, Correspondence Files, 1913-1940, "Results of the Study of the Retail Grocery Trade by the Harvard Bureau of Business Research," Boston Credit Men's Association, December 14, 1915; folder 2, The Chicago Association of Credit Men, "Significance to the Credit man of the Work of the Harvard Bureau of Business Research," Melvin T. Copeland, September 20, 1915.

[71] M.R. Neifeld, "Institutional Organization of Consumer Credit," *Law and Contemporary Problems* 23 (1941), 30.

[72] A B. Buckeridge, "The Credit Bureau as a Branch of the Credit Department," *Credit Manager Yearbook and Third Annual Convention Report*, Credit Manager Division, National Retail Dry Goods Association, July 1, 1936.

[73] Data from the 1950s counted 2,500 credit bureaus in the North America, Mexico, Australia and England, but 95% of these were located in the United States. Harold Wallace. *Starting and Managing a Small Credit Bureau and Collection Service* (Washington, DC. Small Business Administration, 1959), 3.

[74] Quoted in Wallace, *Starting and Managing a Small Credit Bureau*, 6.

[75] R. A. Lee, "How Minneapolis Credit Men Maintain a Good Collection Ratio," First Annual Convention Proceedings, Credit Management Division, National Retail Dry Goods Association, Chicago, IL, 1934.

[76] Clyde William Phelps, *Important Steps in Retail Credit Operation* (National Retail Credit Association, 1947), 5, 48, 51-53.

[77] Baker Library, Pamphlet Folder, Vol 2, Helen Sommers, *Practical Keys to Credit Analysis: A Dynamic Approach in Evaluating Credits* (National Association of Credit Men, ca. 1952), 5, 22-23. In a 1941 NBER study, David Durand had demonstrated the use of statistical analysis of borrower characteristics to establish the probability of default or nonpayment. David Durand, *Risk Elements in Consumer Installment Financing* (New York, 1941).

[78] Wannamaker's had introduced a form of revolving credit in the 1930s, allowing customers to carry unpaid balances. Oil companies issued cards en masse to the public in the 1930s. The first credit cards (Dinner's Club, Carte Blanche and American Express) appeared in the 1950s. With the exception of the oil company cards, however, these were either tied to the customer base of an established institution, as with the stores, or drawn from an elite clientele. The early credit cards did not allow for unpaid balances to carry over. Marron, *Consumer Credit in the United States*, 80-81. Timothy Wolters, "Carry Your

Credit in Your Pocket": The Early History of the Credit Card at Bank of America and Chase Manhattan," Enterprise *& Society* 1 (June, 2000), 315-54.

[79] Wolters, "Carry Your Credit," 331-333.

[80] Wolters, "Carry Your Credit," 349. James Cortada, *The Digital Hand*, vol. 2 (Oxford University Press, 2006), 61-62.

[81] Cortada, *Digital Hand*, vol. 2, 44-49.

[82] See for example, Charles Babbage Institute (CBI), Robert Head Collection, Box 7, Folder 16: Consumer Credit, 1963-4, Thomas Cordry to Jess Lynch, March 11, 1964.

[83] CBI, Willis Ware Collection, Box 5, Folder 3: Hearing Transcript, Aug 4, 1976, Credit Reporting and Payment Authorization Services, 'Testimony of John Spafford, Clarke Newlin, D Barry Connelly, Don Ogden and Glen Uffman, representing Associated Credit Bureau," 11, 20.

[84] CBI, Ware Collection, 'Testimony of John Spafford, Clarke Newlin, D. Barry Connelly, Don Ogden and Glen Uffman," 27-28.

[85] CBI, Head Collection, Box 7, Folder 16: Consumer Credit, 1963-4, "A Proposal for Improving CCS," L. H. Canan, Security First National Bank (1963).

[86] CBI, Head Collection, Box 7, Folder 18: Credit Scoring "A Review of the Development and Implementation of Credit Screening, By Computer," John D. Toeller, Ernst & Ernst (ca. 1963).

[87] CBI, Ware Collection, Box 11, Folder 21: "Statement of Edward J. Brennan, Jr. Vice President & General Manager, TRW Information Services, Before the Privacy Protection Study Commission," August 4, 1976.

[88] 'CBI, Ware Collection, "Testimony of John Spafford, Clarke Newlin, D Barry Connelly, Don Ogden and Glen Uffman." In 1976, there were still some 1,800 independent credit bureaus, and only 200 had moved from manual to automated methods.

[89] Evans and Schmalensee, *Paying with Plastic*, 65-67.

[90] Evans and Schmalensee, *Paying with Plastic*, 3-10.

[91] CBI, Ware Collection, Box 8, Folder 9: Background Notebook: Credit Cards "Statement by National BankAmericard Incorporated," Feb. 11-12, 1976, Privacy Commission Hearings (Dee Hock).

[92] Martha Poon, "Scorecards as Devices for Consumer Credit: The Case of Fair, Isaac & Company, Incorporated," *The Sociological Review* 55, (2007), 284-306. Fair, Isaac had been producing custom scorecards for individual companies, a labor intensive process of data gathering. The availability of large databanks of credit information on large populations allowed it to develop the FICO score.

[93] John Nevin, "The Equal Credit Opportunity Act: An Evaluation," *Journal of Marketing 43 (*Spring 1979), 95-104.

[94] Hyman, *Debtor Nation*, notes that feminists argued that shifting credit evaluation to credit histories rather than demographic characteristics was a cure for discrimination, and since women often had less credit history, it was also necessary to track individuals throughout their economic lives.

[95] James Rule, *Private Lives and Public Surveillance* (New York: Schocken, 1974) discusses the shift of privacy discourse toward fairness, accuracy and security, and away from the type, amount or control and ownership of personal information.

[96] Indeed, certain other legislation actually mandated the collection of just this sort of data. For example, the 1968 Consumer Credit Protection Act's Regulation Z required capturing of certain information about open ended credit—date, amount, brief description of goods or services bought, name city and state of vendor.

[97] CBI Ware Collection, Box 1, Folder 17, Credit Reporting, Memo 31 May 1972, Privacy Study Group Trip Report.

[98] Noel Capon, "Credit Scoring Systems: A Critical Analysis," *Journal of Marketing* 46 (Spring, 1982), 82-91. In 1979 testimony, William Fair argued that race, gender and religion should be included if they were shown to be valid predictors.

[99] Martha Poon, "From New Deal Institutions to Capital Markets: Commercial Consumer Risk Scores and the Making of Subprime Mortgage Finance," *Accounting, Organizations and Society* 34 (2009), 661-2.

[100] Charles Perrow, *Normal Accidents: Living with High-Risk Technologies* (New York: Basic Books, 1984). For a somewhat different application of the sociology of knowledge to financial risk assessment, see Donald MacKenzie, "The Credit Crisis as a Problem in the Sociology of Knowledge," unpublished paper, September, 2010.